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Serial No. **09/856,761**	Filing Date **May 23, 2001**	Examiner **Sealy, Lance W**	Group Art Unit **2671**

Title:

A Method for Forming a Perspective Rendering from Voxel Space

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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DRAFT FOR DISCUSSION

Sir:

Following our telephone conversation, please find attached four possible claims which could be used as claim 1 in our response to the above referenced application.

1. (option 1 – no amendment) A method of forming a high spatial resolution perspective rendering from a low spatial resolution voxel data set, comprising:

(a) raycasting at least one ray from a predetermined location into the voxel space, by sampling points along said ray in a space defined by said voxel data set;

(b) accumulating the effect of opacity along the ray path, using opacity values at said sampling points, into a ray storage value;

(c) associating points along the cast ray with material classes;

(d) determining if a ray passes from a point in a first material class to a point in a second material class;

(e) if the ray is determined to pass between classes, accumulating a boundary visualization-value associated with a boundary between the two classes into said ray storage value;

(f) repeating at least (a), (b), (d), and (e) for a plurality of cast rays; and

(g) forming a high spatial resolution perspective rendering from said determining ray storage values.

Applicants are of the opinion that the term material classes is well defined in the following passages and amendment is not required. The term "material classes" is defined in the specification, for example, on page 5, lines 21-22:

"A "class" is the region in space in which the interpolation function assumes values that belong to a predefined interval.";

on page 7 lines 27-28:

"Furthermore, a change of class is detected by noting a change in opacity between two consecutive steps on a vector.";

and on page 8, lines 4-7:

"According to the preferred embodiment of the present invention, volume lighting contributions are produced everywhere, whereas surface lighting contributions are only produced when crossing from a class of lower opacity to a class of higher opacity".

Alternatively, either of the amendments in options 2 and 3, could be made:

1. (option 2) A method of forming a high spatial resolution perspective rendering from a low spatial resolution voxel data set, comprising:

(a) raycasting at least one ray from a predetermined location into the voxel space, by sampling points along said ray in a space defined by said voxel data set;

(b) accumulating the effect of opacity along the ray path, using opacity values at said sampling points, into a ray storage value;

(c) associating points along the cast ray with material classes, according to the opacity values of the points;

(d) determining if a ray passes from a point in a first material class to a point in a second material class;

(e) if the ray is determined to pass between classes, accumulating a boundary visualization-value associated with a boundary between the two classes into said ray storage value;

(f) repeating at least (a), (b), (d), and (e) for a plurality of cast rays; and

(g) forming a high spatial resolution perspective rendering from said determining ray storage values.

1. (Option 3) A method of forming a high spatial resolution perspective rendering from a low spatial resolution voxel data set, comprising:

(a) raycasting at least one ray from a predetermined location into the voxel space, by sampling points along said ray in a space defined by said voxel data set;

(b) accumulating the effect of opacity along the ray path, using opacity values at said sampling points, into a ray storage value;

(c) associating points along the cast ray with material classes, different material classes corresponding to different intervals of the opacity values of the points;

(d) determining if a ray passes from a point in a first material class to a point in a second material class;

(e) if the ray is determined to pass between classes, accumulating a boundary visualization-value associated with a boundary between the two classes into said ray storage value;

(f) repeating at least (a), (b), (d), and (e) for a plurality of cast rays; and

(g) forming a high spatial resolution perspective rendering from said determining ray storage values.

Further alternatively, the following amendment in option 4 could be made:

1. (option 4) A method of forming a high spatial resolution perspective rendering from a low spatial resolution voxel data set, comprising:

(a) raycasting at least one ray from a predetermined location into the voxel space, by sampling points along said ray in a space defined by said voxel data set;

(b) accumulating the effect of opacity along the ray path, using opacity values at said sampling points, into a ray storage value;

(c) associating points along the cast ray with material classes, corresponding to different types of real world materials;

(d) determining if a ray passes from a point in a first material class to a point in a second material class;

(e) if the ray is determined to pass between classes, accumulating a boundary visualization-value associated with a boundary between the two classes into said ray storage value;

(f) repeating at least (a), (b), (d), and (e) for a plurality of cast rays; and

(g) forming a high spatial resolution perspective rendering from said determining ray storage values.

Based on the specification, for example, page 8, lines 9-12:

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"For example, in a medical data context if a vector traverses through a mucus and encounters a tissue, then this encounter is a front surface; while the continuation of the vector may pass again into a mucus and this "second passing" is a back surface.";

or page 8, lines 26-28:

"consecutive steps skip over a front surface without detecting it. Continuing in the medical context example, suppose there is a membrane (or thin film of tissue or a bone fragment, etc) in the mucus, that is tangential to the vector."

Applicant's agent (Yaakov Schatz, 44,320) will contact the Examiner to discuss these draft claims. The Examiner can reach Yaakov Schatz at 1 (877) 428-5468. Please note that this is a direct *toll free* number in the US that is answered in the undersigned's Israel office. Israel is 7 hours ahead of Washington.

Respectfully submitted,
Shmuel AKERMAN, et al.

Yaakov Schatz
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April 22, 2004